CLAIMS

1) Steering and/or stabilising device for motorised watercraft, with at least two operating units (U) each comprising a retractable fin (4), characterised in that the retractable fins (4) of each operating unit (U) are contained in tubular watertight casings (5) open on the bottom or on the underwater area of the hull and located completely or for their prevailing portion inside the hull, one on the starboard side and the other on the port side, each fin (4) being guided axially in the associated tubular casing (5) and being movable by an actuator (10) outwards and inwards in the casing (5), so that it can be retracted in the casing (5) or projected out of the hull for a variable extent in the water.

2) Device according to claim 1, characterised in that the tubular casings (5) of each couple of operating units are symmetrically located in a transversal section of the hull

3) Device according to claims 1 and 2, characterised in that the axes of tubular casings (5) of the operating units (U) will be symmetrically oriented between a horizontal and vertical inclination.

4) Device according to claim 1, characterised in that the tubular casing (5) of each operating unit (U) has a pit-like form.

5) Device according to claims 1 to 4, characterised in that the actuators (10) of the operating units (U) are interconnected and manoeuvrable so that the respective fins (4) can be kept retracted during sailing on course or projected individually and preferably alternatively or for a different extent in the water on one site or on the other one, so as to act as steering fins.

6) Device according to claim 1, characterised in that the tubular casings (5) of the operating units (U) are oriented horizontally and transversally to the hull of the watercraft and located symmetrically in a transversal section of the hull preferably located between stern and middle ship.

7) Device according to claim 6, characterised in that the actuators (10) of the operating units (U) are interconnected and manoeuvrable so that the respective fins

(4) can be retracted during sailing on calm waters or projected in the water totally or partially on one side or on the other one during sailing in rough seas, so as to act as stabilising fins by creating a rotational torque on the longitudinal axis of the hull to oppose the effect of the roll.

8) Device according to claims 1 to 7, characterised in that the fins (4) of each operating unit (U) are connected to a guide element (6) axially slidable within the associated tubular casing (5).

9) Device according to claims 1 to 8, characterised in that the tubular casing (5) in which the blade (4) and its guide (6) are slidably guided has a predominantly square or rectangular or at least prismatic hollow section.

10) Device according to the preceding claims 1 to 9, in which the blade (4) is connected to a box-like structure (6) closed at the base and open at the top, characterised in that said blade (4) can slide within the casing (5) and has a section similar to that of the casing (5), conveniently reduced in scale so as to permit the interposition of suitable anti- friction elements, preferably fitted to the box (6) and consisting of cleats or strips (13), the blade (4) and box (6) also being capable of being made in one piece.

11) Device according to the preceding claims, according to which each operating unit comprises a blade (4) made from any sufficiently strong material such as bronze, stainless steel, titanium alloy or the like, the said blades (4) being also provided with a substantially concave profile, suitably tapered and with a variable angle of attack between the tip and the root to provide progressive action during its immersion.

12) Device according to the preceding claims, characterised in that the casing (5) of the operating units is made from a predominantly square or rectangular or prismatic section made from material suitable for the type of hull, the said casing being provided with at least one flange (8) on its top to receive a watertight cover (9) and a flange (7) for its secure fixing to the hull, the said flange (7) being preferably provided with a slot (71) to allow the movement of the blade (4) with a clearance which is barely sufficient to allow the water to flow out and in.

13) Device according to the preceding claims, each operating unit having at its

top an actuator, generally consisting of a conventional double-acting hydraulic cylinder (10) having a strong rod (11) connected to the base of the guide box (6) or to the blade (4), in order to move the latter vertically, while the body of the said cylinder is connected, directly or by means of an interposed flange (12), to the cover (9) of the casing (5).

14) Device according to the preceding claims, with each operating unit (U) provided with a double-acting cylinder (10a) having two concentric walls (19) and (20) spaced a few millimetres apart to form a gap (21) through which the oil for supplying the lower chamber of the said cylinder (10a) can flow, thus allowing the oil to enter the cylinder (10a) at its top instead of at its base.

15) Device according to the preceding claims, characterised in that a connection is provided between the rod (11) of the cylinder (10) and the guide box (6) which in turn is secured to the blade (4), the said connection being formed in such a way as to ensure that the guide (6) can slide freely within the casing (5), without jamming on the said rod, the rod (11) being provided for this purpose with the terminal disc (25), which can transmit the thrust upwards and downwards, but, since it is contained in a housing between the box (6) and the blade (4) provided with sufficient radial play, can allow it to move freely.

16) Device according to the preceding claims, characterised in that it comprises a hydraulic circuit containing a pair of sequence valves (27d) and (27s) fitted on the tops of the starboard actuating cylinder (U1) and the port actuating cylinder (U2), to control the downward movement of one blade only after the corresponding blade on the opposite side has been fully retracted, the said sequence valves being provided with non-return valves (34d) and (34s) operated directly by the extensions (28) of the corresponding pistons (29) which at the end of their strokes can raise the push rods (39) of the valve shutters, thus enabling the oil to flow through them and supply the opposite cylinders.

AMENDED CLAIMS

[received by the International Bureau on 27 July 2005 (27.07.2005); original claims 1-16 replaced by amended claims 1-13 (4 pages)]

1) Steering and/or stabilising device for motorised watercraft, with at least two operating units (U) each comprising a retractable fin (4), the said retractable fins (4) of each operating unit (U) being contained in tubular watertight casings (5) open on the bottom or on the underwater area of the hull and located completely or for their prevailing portion inside the hull, one on the starboard side and the other on the port side, each fin blade(4) being guided axially in non-tilting manner in the associated tubular casing (5) and being movable in the casing by an actuator (10) outwards and inwards so that it can be alternatively retracted or projected out of the hull during the navigation for a variable extent in the water, characterised by the fact that the said tubular casing (5) in which the said fin blade (4) and its guide (6) are slidably guided has a non round cross section and preferably a predominantly square or rectangular or at least prismatic hollow cross section.

2) Device according to claim 1, in which the said fin blades (4) of each of the said operating units (U) have a wing-like profile with a constant angle of incidence or preferably a variable angle of attack between the tip and the root to provide progressive action during its immersion

3) Device according to claim 1, characterised in that the tubular casing (5) of each operating unit (U) has a pit-like form.

4) Device according to claims 1 to 3, characterised in that the actuators (10) of the operating units (U) are interconnected and manoeuvrable so that the respective fin blades (4) can be retracted or projected individually and preferably alternatively in the water flow for a different extent in one

side or on the other one, causing in this way reaction forces on the hull capable to steering or reducing the rolling effect.

5) Device according to claim 1, characterised in that the tubular casings (5) of the operating units (U) are located symmetrically in a transversal section preferably located in astern area in case of the units employed as steering device and between stern and middle ship in case of the units employed for stabilising purpose

6) Device according to claim 5, characterised in that the actuators (10) of the operating units (U) are interconnected and manoeuvrable so that the respective fins (4) can be retracted during sailing on calm waters or projected in the water totally or partially on one side or on the other one during sailing in rough seas, so as to act as stabilising fins by creating a rotational torque on the longitudinal axis of the hull to oppose the effect of the roll.

7) Device according to any one of the preceding claims 1 to 6, in which the blade (4) is connected to a guide (6) closed at the base and open at the top, characterised in that said blade (4) can slide within the casing (5) and has a section similar to that of the casing (5), conveniently reduced in scale so as to permit the interposition of suitable anti- friction elements, preferably fitted to the guide (6) and consisting of cleats or strips (13), the blade (4) and guide (6) also being capable of being made in one piece.

8) Device according to any one of the preceding claims 1 to 7, according to which each operating unit comprises a blade (4) made from any sufficiently strong material such as bronze, stainless steel, titanium alloy or the like, the said blades (4)

being also provided with a substantially concave profile

9) Device according to the preceding claims 1 to 8, characterised in that the casing (5) of the operating units is made from a predominantly square or rectangular or prismatic section made from material suitable for the type of hull, the said casing being provided with at least one flange (8) on its top to receive a watertight cover (9) and a flange (7) for its secure fixing to the hull, the said flange (7) being preferably provided with a slot (71) to allow the movement of the blade (4) with a clearance which is barely sufficient to allow the water to flow out and in.

10) Device according to the preceding claims 1 to 9, each operating unit having at its top an actuator, generally consisting of a conventional double-acting hydraulic cylinder (10) having a strong rod (11) connected to the base of the guide guide (6) or to the blade (4), in order to move the latter vertically, while the body of the said cylinder is connected, directly or by means of an interposed flange (12), to the cover (9) of the casing (5).

11) Device according to the preceding claims 1 to 10, with each operating unit (U) provided with a double-acting cylinder (10a) having two concentric walls (19) and (20) spaced a few millimetres apart to form a gap (21) through which the oil for supplying the lower chamber of the said cylinder (10a) can flow, thus allowing the oil to enter the cylinder (10a) at its top instead of at its base.

12) Device according to claim 11, characterised in that a connection is provided between the rod (11) of the cylinder (10) and the guide(6) which in turn is secured to the blade (4), the said connection being formed in such a way as to ensure that the guide (6) can slide freely within the casing (5), without jamming on the said rod, the

rod (11) being provided for this purpose with the terminal disc (25), which can transmit the thrust upwards and downwards, but, since it is contained in a housing between the guide (6) and the blade (4) provided with sufficient radial play, can allow it to move freely.

13) Device according to any one of the preceding claims 1 to 12, characterised in that it comprises a hydraulic circuit containing a pair of sequence valves (27d) and (27s) fitted on the tops of the starboard actuating cylinder (U1) and the port actuating cylinder (U2), to control the downward movement of one blade only after the corresponding blade on the opposite side has been fully retracted, the said sequence valves being provided with non-return valves (34d) and (34s) operated directly by the extensions (28) of the corresponding pistons (29) which at the end of their strokes can raise the push rods (39) of the valve shutters, thus enabling the oil to flow through them and supply the opposite cylinders.